

SCIENTIFIC NOTE

OCCURRENCES OF PHLEBOTOMINE SAND FLIES (DIPTERA: PSYCHODIDAE) POTENTIALLY ASSOCIATED WITH LEISHMANIASIS TRANSMISSION IN URBAN PARKS IN THE CITY OF SÃO PAULO, BRAZIL

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ABSTRACT. A study of the phlebotomine sand flies was carried out between October 2011 and June 2013 in municipal parks in the city of São Paulo. A total of 173 specimens of 5 species were collected (*Psychodopygus lloydi*, *Pintomyia fischeri*, *Lutzomyia amarali*, *Nyssomyia whitmani*, and *Migonemyia migonei*). Three of these species may be involved in the transmission of the causative agent of tegumentary leishmaniasis. Surveillance and monitoring phlebotomine species from these areas are crucial as measure of prevention and control of leishmaniasis.

KEY WORDS Leishmaniasis, phlebotomines, São Paulo, urban parks

Phlebotomines are vectors of protozoa in the genus *Leishmania*, the causative agents of leishmaniasis. Although infection in humans is mainly associated with rural areas, this has been changing and cases have been recorded in urban areas. Visceral leishmaniasis, for example, has been reported in large cities of Brazil, such as Campo Grande (MS), Rio de Janeiro (RJ), and Campinas (SP) (Lainson and Shaw 2005). The spread of leishmaniasis can be attributed particularly to environmental changes, such as climate change, the introduction of the protozoan into new areas, whether because of migration or tourism to endemic areas, and the adaptation of phlebotomine species to urban areas, especially because of the presence of forest fragments or green enclaves in built-up areas. However, few studies on phlebotomine fauna in the municipality of São Paulo have been published recently (Moschin et al. 2013, Castelo et al. 2015).

The present study reports the results of phlebotomine collections carried out monthly between October 2011 and June 2013 in 10 selected municipal parks in the city of São Paulo (Anhanguera Park, Burle Marx Park, Piqueri Park, Santo Dias Park, Shangrilá Park, Ibirapuera Park, Chico Mendes Park, Previdência Park, Alfredo Volpi Park, and Cramo Park). The municipality extends over 1,521.11 km² and has 107 municipal parks, which play an important role in microclimate regulation and biodiversity conservation and, by providing a leisure space, help to ensure the well-being of the population. Phlebotomine sand flies were found in only 5 parks: Anhanguera Park (23°25'68"S, 46°47'320"W), Burle Marx Park (23°37'932"S, 46°43'268"W), Previdência Park (23°34'753"S, 46°43'597"W), Santo Dias Park (23°39'784"S, 46°46'393"W), and Shangrilá Park (23°45'690"S, 46°39'841"W) (Fig.

1). Phlebotomine sand flies were collected with the Centers for Disease Control and Prevention (CDC) light traps and a Shannon trap for 2 h starting at dusk. They were prepared and mounted on slides with ENECE and identified according to Galati (2016). A total of 173 specimens belonging to 5 species were collected: *Psychodopygus lloydi* (Antunes) (56.07%), *Pintomyia fischeri* (Pinto) (41.62%), *Lutzomyia amarali* (Barretto and Coutinho) (1.16%), *Nyssomyia whitmani* (Antunes and Coutinho) (0.58%), and *Migonemyia migonei* (França) (0.58%) (Table 1). According to the traps used, 90.41% of the *Pi. fischeri*, 45.36% of the *Ps. lloydi*, 100% of the *Mg. migonei*, and 50% of the *Lu. amarali* were collected with the Sherman trap, while 9.58%, 54.64%, 0%, and 50% of these species were collected in CDC light traps, respectively.

Three of the species collected (*Pi. fischeri*, *Mg. migonei*, and *Ny. whitmani*) are anthropophilic and have been reported in areas where cases of leishmaniasis occur and may be involved in the transmission of *Leishmania braziliensis* (Viannia 1911), the causative agent of tegumentary leishmaniasis (Diniz et al. 2014). *Pintomyia fischeri* was one of the most abundant species (41.62%) found in all 5 parks. In addition to its possible role in the transmission of *L. (V.) braziliensis*, this species is susceptible to infection by, and is a potential vector of, *Leishmania infantum* (Nicolle 1908), the etiologic agent of visceral leishmaniasis (Diniz et al. 2014, Galvis-Ovallos et al. 2017). *Migonemyia migonei* was found in very low abundance, but it is a species of epidemiological importance, which has been recently defined by Guimarães et al. (2016) as a permissive species, i.e., it can transmit different species of *Leishmania*. The potential of *Mg. migonei* to act as a vector in the transmission of *L. braziliensis*, *L. infantum*, and *L. amazonensis* (Lain-

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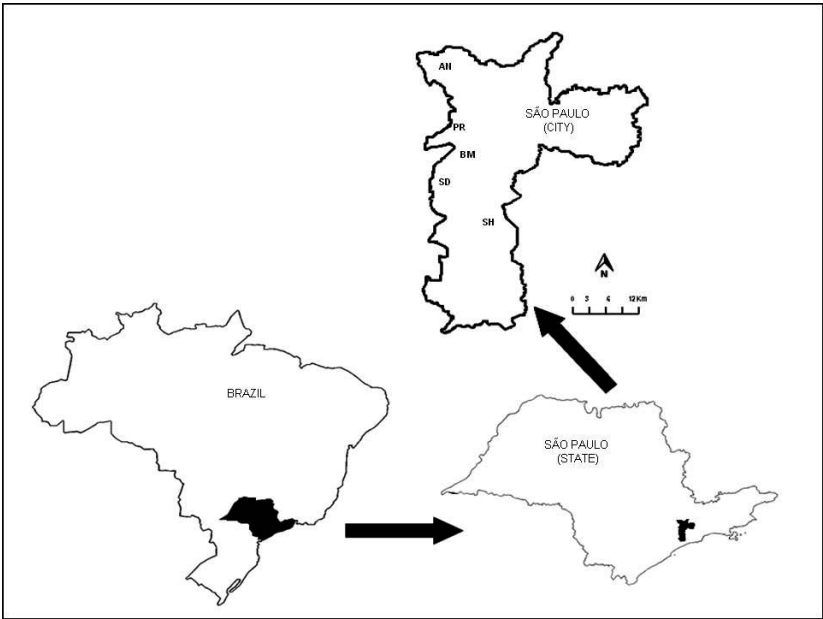


Fig. 1. Location of the municipal parks in the city of São Paulo, SP, Brazil. AN, Anhanguera Park; BM, Burle Marx Park; PR, Previdência Park; SH, Shangrilá Park; SD, Santo Dias Park.

son & Shaw) (Nieves and Pimenta 2000, Carvalho et al. 2010) has been reported in the literature.

In addition to being considered a vector of *L. (V.) braziliensis* in various regions of Brazil, the 3rd epidemiologically important species, *Ny. whitmani*, was one of the least abundant species found in the parks; it is noteworthy for its probable involvement in the transmission of *L. infantum* and was recently found infected by *L. (V.) guyanensis* (Floch 1954) (Moya et al. 2017, Souza et al. 2017).

The other 2 species collected were *Lu. amarali* and *Ps. lloydi*. *Psychodopygus lloydi* belongs to a genus that contains various species involved in the transmission of leishmaniasis. *Psychodopygus lloydi* was the most abundant species found in the 5 parks. Using molecular analysis, Quaresma et al. (2012) and Tonelli et al. (2017) found females of this species positive for *L. braziliensis* and noted that *Ps. lloydi* may be involved in the maintenance of the sylvatic cycle of leishmanias. In contrast, *Lu. amarali* was found in very a low frequency. It is a nonanthropo-

philic species and typically found in wooded areas, and there is no evidence that it plays a role in transmitting leishmaniasis to humans.

In recent years vectors of visceral leishmaniasis have adapted to urban areas, leading to the emergence of the disease in these areas. This is reflected in a study in transmission areas for visceral leishmaniasis in the west of the state of São Paulo, which found that 97.4% of human cases originated in urban areas (Cardim et al. 2016). The parasite *Leishmania infantum* has already been found in greater São Paulo in municipalities such as Cotia and Embu, where there were reports of canine transmission (SUCEN 2005). Autochthonous cases of tegumentary leishmaniasis have occurred throughout the state of São Paulo and sporadically in greater São Paulo, where there have been reports of cases in the region of Cantareira State Park (Moschin et al. 2013). Surveillance and monitoring species from these areas is therefore fundamental to draw up leishmaniasis prevention and control measures.

Table 1. Distribution of phlebotomine species captured in 5 parks in the city of São Paulo, SP, Brazil, between October 2011 and June 2013.

Species	Anhanguera		Burle Marx		Previdência		Santo Dias		Shangrilá		Total (%)
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	
<i>Psychodopygus lloydi</i>	83	13	1	0							97 (56.07)
<i>Pintomyia fischeri</i>	2	1	1	0	32	16	9	2	9	0	72 (41.62)
<i>Lutzomyia amarali</i>					1	0	1	0			2 (1.16)
<i>Nyssomyia whitmani</i>	0	1									1 (0.58)
<i>Migonemyia migonei</i>					1	0					1 (0.58)
Total	100		2		50		12		9		173

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